



## WHAT IS CLAIMED IS:

1. An electronic device, comprising:

2 an active region located over a substrate;

3 an undoped layer located over the active region, the undoped  
4 layer having a barrier region including aluminum located thereover;

5 and

6 a doped upper cladding layer located over the barrier region.

2. The electronic device as recited in Claim 1 wherein the  
3 barrier region is a barrier layer or a number of barrier layers  
located between a plurality of the undoped layers.

2. The electronic device as recited in Claim 2 wherein the  
3 number of barrier layers ranges from about 1 to about 8 layers and  
each of the number of barrier layers has a thickness of about 1 nm.

4. The electronic device as recited in Claim 1 wherein the  
2 barrier region includes an barrier layer consisting of aluminum  
3 arsenide, aluminum phosphide, indium aluminum arsenide, indium  
4 aluminum arsenide phosphide, or indium aluminum gallium arsenide.

5. The electronic device as recited in Claim 4 wherein the

2       barrier layer comprises between about 5 and about 50 percent  
3       aluminum.

6.       The electronic device as recited in Claim 1 wherein the  
2       barrier region has a thickness of about 1 nm and the undoped layer  
3       has a thickness of about 10 nm.

7.       The electronic device as recited in Claim 1 wherein the  
2       barrier region does not form a p-n junction with the doped upper  
3       cladding layer.

8.       The electronic device as recited in Claim 1 wherein the  
2       doped upper cladding layer is doped with zinc and the barrier  
3       region inhibits the diffusion of zinc into the active region.

9. A method of manufacturing an electronic device,

2 including:

3 forming an active region over a substrate;

4 forming an undoped layer over the active region, the undoped

5 layer having a barrier region including aluminum formed thereover;

6 and

7 forming a doped upper cladding layer over the barrier region.

10. The method as recited in Claim 9 wherein the barrier

2 region is a barrier layer or a number of barrier layers located

3 between a plurality of the undoped layers.

11. The method as recited in Claim 10 wherein the number of

2 barrier layers ranges from about 1 to about 8 layers and each of

3 the number of barrier layers has a thickness of about 1 nm.

12. The method as recited in Claim 9 wherein the barrier

2 region includes an aluminum barrier layer consisting of aluminum

3 arsenide, aluminum phosphide, indium aluminum arsenide, indium

4 aluminum arsenide phosphide, or indium aluminum gallium arsenide.

13. The method as recited in Claim 12 wherein the barrier

2 layer comprises between about 5 and about 50 percent aluminum.

14. The method as recited in Claim 9 wherein the barrier  
2 region has a thickness of about 1 nm and the undoped layer has a  
3 thickness of about 10 nm.

15. The method as recited in Claim 9 wherein the barrier  
2 region does not form a p-n junction with the doped upper cladding  
3 layer.

16. The method as recited in Claim 9 wherein forming a doped  
2 upper cladding layer includes forming a zinc doped upper cladding  
3 layer, wherein the barrier region inhibits the diffusion of zinc  
4 from the upper cladding layer into the active region.

17. An optical fiber communications system, comprising:  
2       an optical fiber;  
3       a transmitter and a receiver connected by the optical fiber;  
4       and  
5       an electronic device, including:  
6           an active region located over a substrate;  
7           an undoped layer located over the active region, the  
8       undoped layer having a barrier region including aluminum located  
9       thereover; and  
10           a doped upper cladding layer located over the barrier  
11       region.

18. The optical fiber communication system recited in Claim  
17 wherein the barrier region is a barrier layer or a number of  
2       barrier layers located between a plurality of the undoped layers.

19. The optical fiber communication system recited in Claim  
2       17 wherein the transmitter or the receiver includes the electronic  
3       device.

20. The optical fiber communication system recited in Claim  
2       17 further including a source or a repeater.

ELECTRONIC DEVICE HAVING A BARRIER REGION  
INCLUDING ALUMINUM AND A METHOD OF MANUFACTURE THEREFOR

ABSTRACT OF THE DISCLOSURE

The present invention provides an electronic device having  
5 superior qualities. The electronic device includes an active  
region located over a substrate and an undoped layer located over  
the active region, the undoped layer having a barrier region  
including aluminum located thereover. The electronic device  
further includes a doped upper cladding layer located over the  
barrier region. In an exemplary embodiment of the invention, the  
barrier region is a barrier layer or a number of barrier layers  
located between a plurality of the undoped layers.

100-200-300-400-500-600-700-800-900